FOREST PRODUCTS
Project Fact Sheet

CORROSIVITY MONITORING OF KRAFT MILLS

BENEFITS

- Provides valid information on how to operate kraft recovery boilers to prevent corrosion
- Increases safety in pulp and paper mills
- Decreases "downtime" of capital equipment in mills
- Identifies corrosion-related parameters
- Stimulates development of new materials and/or technologies for use in boiler environments

APPLICATIONS

The products of this investigation will be made available to recovery-boiler operators in pulp and paper mills so they may predict conditions that lead to corrosion and protect their equipment.

Study Will Help Predict and Prevent Conditions Leading to Tube Corrosion in Recovery Boilers

The pulp and paper industry must continually face the problem of tube corrosion on the fire side of boilers that are used to recover chemicals from the kraft pulping process. The corrosion is often responsible for economic losses due to equipment failure, but can also cause the wall tube to rupture. This could lead to smelt-water interaction and might cause an explosion, endangering human life and property. A greater understanding of recovery-boiler corrosion kinetics is needed to avoid such incidents. Boiler operators also need information on how various operating conditions may affect corrosion.

Investigators have developed a comprehensive database on corrosion kinetics and a device for measuring conditions that control corrosion in operating boilers. These tools will enable operators to predict the effects of different operating conditions and avoid damage to the boilers.

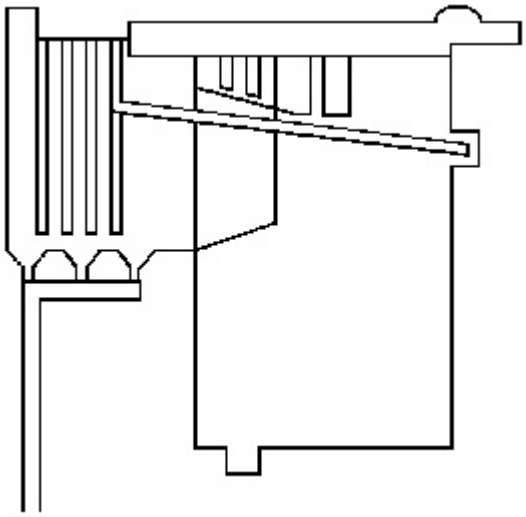

Figure 1. This simplified schematic shows the on-line liquor analysis system in the liquor circulation line. In addition to in-situ NIR analysis, two injection valves arranged in series deliver a precise quantity of a sample of cooking liquor to the individual sample loops for analysis.

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PROJECT DESCRIPTION

Goal: To develop a comprehensive database on corrosion kinetics, and a device for measuring conditions that control corrosion in operating boilers.

After the feasibility of the project was established, the work moved through the engineering-development phase. To build the corrosion-kinetics database, an extensive literature survey was undertaken and data collected from fundamental research projects and from studies in the refinery, coal gasification, and pulp and paper industries. Experiments were conducted to provide missing information. Researchers studied the effects on corrosivity of various aspects of recovery boiler operations, including temperature, heat flux, materials, and mixtures of gases.

In-situ monitoring of recovery boiler environments was carried out to characterize the corrosive environment in lower furnace areas of kraft recovery boilers. Boilers with different firing practices were selected for this study. Gaseous environments responsible for high-temperature corrosion in lower furnace areas have provided new insight into the corrosion mechanisms operating in these areas. Results from this work will provide new corrosion mitigation strategies for these areas of kraft recovery boilers.

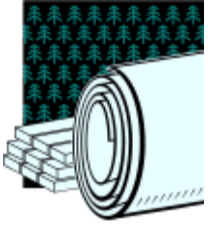
A device was developed to monitor and measure corrosive conditions in boilers over a finite time period. Various techniques were considered, including electrochemical measurements, electrical resistance, and surface-layer activation. After determining the most promising sensor design, it was tested in the laboratory to study its ability to function in various boiler environments. This device is being tested in operating boilers, with the sensor placed in areas where corrosive conditions were previously identified.

PROGRESS & MILESTONES

- The project will end in September 1999, and the technology will proceed to commercialization.

AWARDS, PATENTS, AND INVENTION RECORDS

- Support Aerated Biofilm Reactor Patent #5,116,506, May 26, 1991



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